UV-triggered photoinsertion of contrast agent onto polymer surfaces for in vivo MRI-visible medical devices

Titre	UV-triggered photoinsertion of contrast agent onto polymer surfaces for in vivo MRI-visible medical devices
Type de publication	Article de revue
Auteur	Schulz, Anita [1], Lemaire, Laurent [2], Bethry, Audrey [3], Allegre, Lucie [4], Cardoso, Maida [5], Bernex, Florence [6], Franconi, Florence [7], Goze-Bac, Christophe [8], Taillades, Hubert [9], Garric, Xavier [10], Nottelet, Benjamin [11]
Type	Article scientifique dans une revue à comité de lecture
Année	2019
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Titre de la revue	Multifunctional Materials
Résumé en anglais	Polymeric materials are largely employed for the manufacturing of implants for various reasons, but they are typically invisible by conventional imaging methods. To improve surgical procedure and postoperative implant follow-up though, biomaterials are needed which allow an accurate and efficient imaging. Here, we present a direct and versatile strategy that allows to covalently immobilize T1 magnetic resonance imaging (MRI) contrast agents at the surface of various clinically relevant polymeric biomaterials. An aryl-azide bearing complex of 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA) and gadolinium (Gd) has been synthesized for easy photografting onto polymer surfaces. Polycaprolactone (PCL), polylactide (PLA), polyurethane (PU), polyetheretherketone (PEEK) and polypropylene (PP) have been selected as clinically relevant substrates and successfully functionalized with the photosensitive MRI probe DOTA/Gd. Following in vitro assessment of their biocompatibility and MRI visibility, commercial MRI-visible PP hernia repair meshes (MRI-meshes) have been prepared. MRI-meshes have been implanted in rats for in vivo evaluation of their imaging capacities over 1 month. Histological evaluation and Gd biodistribution studies have been carried out confirming the potential of this straightforward approach to simply yield imageable medical devices.
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